The following criteria should be considered during the process of assessing the appropriateness (benefits and limitations) of BMPs for a particular project:

project characteristics;
site factors;
pollutant removal capability;
short-term and long-term costs;
responsibility for maintenance;
contributing watershed area; and
environmental enhancement.

C.1 PROJECT CHARACTERISTICS

Selection of BMPs for a project is a function of project characteristics, such as type or size of project. Post-construction activities and operations that may be potential sources of storm water pollution are often the same for a given type of project. Projects developed on large sites provide the opportunity to incorporate a wider variety of BMPs, whereas smaller sites often have physical constraints precluding implementation of BMPs requiring large land areas.

C.2 SITE FACTORS

Site factors have common physical restrictions on BMPs and include:

Steep Slopes: Steep slopes restrict the use of several BMPs. Porous pavement must be situated in sites with slopes of 5 percent or less. Swales can only be used if their slope is less than 5 percent; however, swales often can be used perpendicular to the slope or with a drop structure. Also, because of slope stability concerns, infiltration trenches and filter strips are not practical when slopes exceed 20 percent.

High Water Table: The water table acts as an effective barrier to exfiltration and can sharply reduce the ability of an infiltration BMP to drain properly. If the height of the seasonally high water table extends to within 4 feet (1.2 meters) of the bottom of an infiltration BMP, the site is seldom considered suitable. Given the climate and geology of Southern California, this is typically not an issue, except for some areas adjacent to surface water bodies.

Soil Permeability: The type of soil is an important characteristic that can limit the applicability of a particular BMP at a particular site since the long term percolation rate is governed by soil type. This soil permeability factor is particularly relevant to infiltration BMPs, which should not be applied to sites with infiltration rates of less than 0.27 inch per hour (0.686 centimeters), as defined by the least permeable layer in the shallow soil profile. This limiting rate excludes most "C" and "D" soils (Soil Classification System), which cannot exfiltrate enough runoff through the subsoil. In addition, extremely permeable sandy soils may not maintain adequate water levels in wet ponds.

Proximity to Foundations and Wells: Since infiltration BMPs divert runoff back into the soil, some development sites may experience difficulty with local seepage, especially if located near a building foundation. Another risk due to diverted runoff through infiltration may be contamination of groundwater supplies. Limited research has been performed to evaluate this risk, however, it is advisable to maintain infiltration BMPs at least 100 feet (30 meters) from drinking water wells. The risk is greater when shallow soils with organic materials are bypassed.

Climatic Region: BMPs should include appropriate designs to address issues of rainfall volume and intensity during wet weather seasons so as to consider the economic feasibility of using such BMPs and/or designs. Typically, the evaluation of long term rainfall records must be considered together with site conditions to properly size structural treatment BMPs. In addition, wet ponds require some continuous flow (dry weather water source) to keep them from stagnating or developing odor and mosquito problems.

Land Consumption: Some sites are too intensively developed or limited in area to allow for some BMPs, such as pond BMPs and porous pavement, which require a large surface area and buffer area.

Maximum Depth: To preserve storage capacity for subsequent rain events, keep water from stagnating, and provide optimal pollutant removal conditions, infiltration BMPs must be designed to completely drain within 2 to 3 days after a storm. If the infiltration rates of the underlying soils are slow, the available depth of the infiltration facility may be limited. These restrictions vary depending on whether the facility is a trench, basin, injection well, or porous pavement.

Restricted Land Uses: Certain BMPs can only be applied to particular land uses, and are not broadly applicable for all development sites. Porous pavement can only be used for sites with parking lots not expected to receive heavy car or truck traffic, or much sediment.

High Sediment Input: Most BMPs are unable to handle the large loads of sediment that may be generated during the construction phase of development. Infiltration BMPs are particularly susceptible to rapid clogging and subsequent failure if significant sediment loads are allowed to enter the structure. As a general rule, these BMPs should not be installed until all of the land to be disturbed by construction in the contributing watershed is effectively stabilized and will remain stabilized. Contractors must often take unusual steps during the actual installation of the infiltration BMPs to prevent soil compaction or contamination by sediment. To prevent clogging of the infiltration BMPs after construction, many designs call for the use of a pre-treatment device to filter sediment and other coarse particles before they reach the infiltration BMP. In addition, in areas where large amounts of fine sediment may occur even in the absence of upstream construction, BMPs such as porous pavement are not recommended.

Landscape Enhancement: If properly designed, many BMP options have the potential to enhance the urban landscape. Wet ponds and wetlands are frequently used to create a waterfront effect in residential developments, and may actually increase the value of the adjacent property. Dry extended detention areas can serve as attractive parks, either manicured or natural in design, or sports fields. Given the typical rainfall patterns in Southern California, these open areas would be available for public use most of the year. Most infiltration BMPs or lined detention areas have a neutral or negative effect on landscape appearance. In general, BMPs may be visually attractive or aesthetically unappealing, depending upon the creativity of the project designer.

C.3 POLLUTANT REMOVAL CAPABILITY

The nature of the pollutant being removed and its concentration often sets an upper limit on the potential removal rate that can be achieved with a given BMP. The pollutant removal capability of a BMP is primarily governed by three interrelated factors: removal mechanisms as affected by the design of the BMP, fraction of the annual runoff volume that is effectively treated, and nature of the urban pollutant being treated.

Pollutants such as sediment and lead (which is typically bound to fine sediment) can be removed effectively by common BMP removal mechanisms, including settling and filtering. Soluble pollutants such as nitrate, phosphate, and some trace metals are more difficult to remove and require biological and/or chemical mechanisms, such as uptake by bacteria, algae, rooted aquatic plants, organic material, terrestrial vegetation, or soils.

C.4 SHORT-TERM AND LONG-TERM COSTS

The appropriateness of a BMP for a particular site can be affected by economic feasibility considerations that encompass short- and long-term cost factors. Short-term costs include installation costs for both materials and labor. Long-term costs include maintenance. To sustain proper function, some BMPs require low level maintenance on a regular and frequent basis, whereas other BMPs require infrequent maintenance of a more extensive nature. Maintenance costs will include the proper disposal of accumulated material. In selecting a control method, cost considerations—construction, installation, and maintenance—associated with the BMP should be considered.

C.5 RESPONSIBILITY FOR MAINTENANCE

Improper maintenance is one of the most common reasons for water quality controls to not function as designed or to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly.

C.6 CONTRIBUTING WATERSHED AREA

The feasibility of a particular BMP depends on the contributing watershed area. A BMP cannot be practically suitable for all urban area sizes. For instance, wet pond BMPs generally require a significant contributing watershed area of greater than 10 acres (4 hectares), and in locales such as Southern California, a dry weather source of water. By contrast, infiltration and vegetative BMPs are applicable for catchments less than 10 acres (4 hectares), due to space, economic, or flow volume constraints.

It should be noted that the contributing watershed area does not have to be limited to the development project site. By using local topography and drainage, the contributing watershed area may be increased or decreased to better accommodate a particular BMP. For example, additional runoff generated away from the development project may be routed to the BMP, thereby increasing total catchment area and making pond options more feasible. Conversely, various portions of the total runoff from a development project site may be diverted to smaller, individual BMPs, thereby decreasing the contributing watershed area and making infiltration and vegetative BMPs more practical.

C.7 ENVIRONMENTAL IMPACT AND ENHANCEMENT

Low Flow Maintenance: Downstream aquatic life may be jeopardized when the natural low flow levels experienced during the dry weather season decline even further because of reduced infiltration in urbanized watersheds. However, this is sometimes offset by irrigation return flows, which may cause unnatural dry weather flow. Infiltration BMPs can contribute significantly to groundwater recharge and may be able to help the watershed better mimic its past hydrologic behavior. Vegetative BMPs such as swales and filter strips appear to have modest potential in this regard, while pond BMPs have little effect in maintaining low flows.

Streambank Erosion Control: Streambank erosion not only contributes large sediment loads to receiving waters, but also has an adverse impact on the habitat quality for downstream aquatic life. Some BMPs, including extended detention ponds, and full exfiltration BMPs, can reduce erosive storm flows enough to keep downstream channels and banks relatively stable, whereas most other BMPs have only marginal capabilities in this regard.

Aquatic/Wildlife Habitat Creation: Some BMP options create wetland or open water areas utilized by waterfowl, marsh birds, and other wildlife. Shallow marshes and wet ponds are particularly well suited for this role, if relatively small investments are made in landscaping design and plant selection. Consideration would have to be given to a dry weather source of water, unless a seasonally wet area is desired. Terrestrial wildlife habitat may be created through the incorporation of BMPs such as wet ponds, extended detention ponds, infiltration basins, and filter strips. Relatively diverse biological communities may further be enhanced through judicious planting of trees, shrubs, and grasses that provide food and cover for the target wildlife.